

What is claimed is:

1. A cathode ray tube comprising:

a panel of which an outer surface is substantially flat and an inner surface

5 has a certain curvature; and

a shadow mask arranged with a certain interval from an inner surface of the panel and having a plurality of apertures through which electron beams pass,

wherein the shadow mask satisfied a condition of  $0.9 \leq ZmD/(ZmX+ZmY) \leq$

1.1, in which an arbitrary point on a diagonal axis of the shadow mask is supposed

10 to be Dr, points on a long axis and a short axis meeting with perpendiculars drawn to the long axis and the short axis from the point Dr are respectively supposed to be Xr and Yr, and intervals between the respective points Xr, Yr, and Dr and the shadow mask in a tube axis direction are respectively supposed to be ZmX, ZmY, and ZmD.

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2. The cathode ray tube of claim 1, wherein the shadow mask satisfies a condition of  $0.9 \leq ZmD/(ZmX+ZmY) \leq 1.0$ .

20 3. The cathode ray tube of claim 1, wherein a radius of curvature of the shadow mask in a direction of the diagonal axis of the shadow mask is gradually decreased from a center of the shadow mask towards a periphery of the shadow mask.

25 4. The cathode ray tube of claim 3, wherein if a functional formula of respective lines connecting a maximum value and a minimum value of a

respective radii of curvature in directions of the long axis, the short axis and the diagonal axis of the shadow mask from a center towards a periphery is supposed to be  $y=Ax+B$ , the shadow mask satisfies a condition of  $-5.0 \leq A \leq -1.0$ , in which  $y$  denotes a radius of curvature,  $x$  denotes a distance from the center of the shadow mask to a position the long axis, the short axis or the diagonal axis,  $A$  denotes a gradient of the lines, and  $B$  denotes a constant.

5. The cathode ray tube of claim 4, wherein the shadow mask satisfies a condition of  $-4.0 \leq A \leq -2.0$ .

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6. The cathode ray tube of claim 1, wherein a radius of curvature at a position on the shadow mask corresponding to the short axis is the smallest among radii of curvature at positions corresponding to the long axis, the short axis and the diagonal axis, when the positions on the shadow mask have the same 15 distance from a center of the shadow mask.

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7. The cathode ray tube of claim 1, wherein the shadow mask satisfies a condition of  $T \leq Ld \times 0.00035$ , in which  $Ld$  denotes a diagonal length of a perforated surface thereof in which the apertures is formed, and  $T$  denotes a thickness of the shadow mask.

8. The cathode ray tube of claim 1, wherein a thickness of the shadow mask is 0.22mm or less.

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9. The cathode ray tube of claim 1, wherein an optical transmittance

ratio of a center portion of the panel is 45%~75%.

10. The cathode ray tube of claim 1, wherein a wedge ratio of a thickness of an end portion of the diagonal axis of the panel to a thickness of a center portion of the panel is 170%~210%.

11. The cathode ray tube of claim 1, wherein a thickness of a center portion of the panel is 10mm~12.5mm.

10 12. The cathode ray tube of claim 1, wherein the panel satisfies a condition of  $R_{py} < R_{pd} \leq R_{px}$ , in which  $R_{px}$ ,  $R_{py}$ , and  $R_{pd}$  respectively denotes radii of curvature of the panel in directions of a long axis, a short axis and a diagonal axis of the panel.

15 13. The cathode ray tube of claim 1, wherein the shadow mask satisfies a condition of  $R_{my} \leq R_{md} \leq R_{mx}$ , in which  $R_{mx}$ ,  $R_{my}$ , and  $R_{md}$  respectively denotes radii of curvature of the shadow mask in directions of the long axis, the short axis, and the diagonal axis at a center portion of the shadow mask.

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14. A cathode ray tube comprising:  
a panel of which an outer surface is substantially flat and an inner surface has a certain curvature; and  
a shadow mask arranged with a certain interval from an inner surface of the panel and having a plurality of apertures through which electron beams pass,

wherein a dimension ratio of the panel is 4:3, a size of an effective surface of the panel on which a phosphor screen is deposited is 650mm~720mm, and the shadow mask satisfies a condition of  $0.9 \leq ZmD/(ZmX+ZmY) \leq 1.1$ , in which an arbitrary point on a diagonal axis of the shadow mask is supposed to be Dr, points 5 on a long axis and a short axis meeting with perpendiculars drawn to the long axis and the short axis from the point Dr are respectively supposed to be Xr and Yr, and intervals between the respective points Xr, Yr, and Dr and the shadow mask in a tube axis direction are respectively supposed to be ZmX, ZmY, and ZmD.

10 15. The cathode ray tube of claim 14, wherein a radius of curvature of the shadow mask in a direction of the diagonal axis of the shadow mask is gradually decreased from a center towards a periphery of the shadow mask.

15 16. The cathode ray tube of claim 15, wherein if a functional formula of respective lines connecting a maximum value and a minimum value of a respective radii of curvature in the directions of the long axis, the short axis and the diagonal axis of the shadow mask from a center towards a periphery is supposed to be  $y = Ax + B$ , the shadow mask satisfies a condition of  $-5.0 \leq A \leq -1.0$ , in which y denotes a radius of curvature, x denotes a distance from the center of 20 the shadow mask to a position on the long axis, the short axis or the diagonal axis, A denotes a gradient of the lines, and B denotes a constant.

25 17. The cathode ray tube of claim 14, wherein a radius of curvature at a position on the shadow mask corresponding to the short axis is smaller than radii of curvature at positions on the shadow mask corresponding to the long axis

or the diagonal axis when the positions corresponding to the long axis, the short axis and the diagonal axis have the same distance from a center of the shadow mask.

5 18. The cathode ray tube of claim 14, wherein a thickness of the shadow mask is 0.22mm or less.

19. The cathode ray tube of claim 14, wherein an optical transmittance ratio of a center portion of the panel is 45%~75%.

10 20. The cathode ray tube of claim 14, wherein a thickness of a center portion of the panel is 10mm~12.5mm.

15 21. The cathode ray tube of claim 14, wherein the panel satisfies a condition of  $R_{py} < R_{pd} \leq R_{px}$ , in which  $R_{px}$ ,  $R_{py}$ , and  $R_{pd}$  denote a respective radii of curvature of panel in directions of a long axis, a short axis and a diagonal axis of the panel.

20 22. The cathode ray tube of claim 14, wherein the shadow mask satisfies a condition of  $R_{my} \leq R_{md} \leq R_{mx}$ , in which  $R_{mx}$ ,  $R_{my}$ , and  $R_{md}$  respectively denotes radii of curvature of the shadow mask in directions of the long axis, the short axis, and the diagonal axis at a center portion of the shadow mask.

25 23. The cathode ray tube of claim 14, wherein the shadow mask is

formed of at least one of Fe-Ni based alloy, Fe-Ni-Co based alloy, or aluminum killed steel.

24. A cathode ray tube comprising:

5 a panel of which an outer surface is substantially flat and an inner surface has a certain curvature; and

a shadow mask arranged with a certain interval from an inner surface of the panel and having a plurality of apertures through which electron beams pass,

wherein if a functional formula of a respective lines connecting a maximum 10 value and a minimum value of a respective radii of curvature in directions of a long axis, a short axis and a diagonal axis of the shadow mask from a center towards a periphery is supposed to be  $y=Ax+B$ , the shadow mask satisfies a condition of  $-5.0 \leq A \leq -1.0$ , in which  $y$  denotes a radius of curvature,  $x$  denotes a distance from the center of the shadow mask to a position on the long axis, the short axis or the 15 diagonal axis,  $A$  denotes a gradient of the lines, and  $B$  denotes a constant.

25. The cathode ray tube of claim 24, wherein the shadow mask satisfies a condition of  $-4.0 \leq A \leq -2.0$ .